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May 30, 1997

The Assistant Commissioner for Patents  
Box PATENT APPLICATION  
Washington, D.C. 20231

Re: PATENT APPLICATION: "PIANOPICS DISPLAY AND ASSOCIATED  
MUSICAL NOTATION"  
Based on Provisional Application NO. 60/018,919

Dear Assistant Commissioner for Patents:

This is a letter whereby I, Jean-Claude Maxime AMAR wishes to remove Casella & Hespos of 274 Madison Avenue, New York, NY 10016, by revoking the power of authorization I had previously granted. I therefore would like all communications relating to the "PIANOPICS DISPLAY AND ASSOCIATED MUSICAL NOTATION" Patent Application to be directly addressed to:

Jean-Claude AMAR  
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(201) 746 3149

Sincerely yours,

*Jean Claude Amar*  
Jean-Claude M. Amar

## PIANOPICS DISPLAY AND ASSOCIATED MUSICAL NOTATION

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The present invention relates to a musical keyboard instruction device, its associated musical notation, and a printed ruler to be used by piano teachers and students in order to convey and acquire literacy for the music of keyboard instruments.

#### 2. Description of the prior art

Standard music notation includes the familiar five-line staff and notes and is used to play basically all instruments. A consequence of this universality is that it makes it necessary for an aspiring piano player to first mentally determine the note name by its notational symbol and second physically find the note on the keyboard. To further complicate the matter, the same note appears on different locations of different staves. In addition the key signatures alters the relationship between the note seen and the key pressed.

A number of keyboard instruction devices have been devised to help learn the standard musical notation system. A great many number of altogether different music notation systems associated or not with a device have been designed, some successfully like the tablatures for guitar play, but most remained unused.

A dedicated keyboard instruction display and associated music notation that create mental pictures directly usable in order to play the piano and memorize pieces has not yet been devised. Therefore an object of this invention is to provide this and introduce the notion of musical "words" referenced here as pianopics.

### SUMMARY OF THE INVENTION

The invention relates to a piano teaching method, a musical keyboard instruction display device, and its associated musical notation showing diagrams which contain necessary and sufficient information about key location, tone length, and the order of the key activation that is used during piano playing. These diagrams follow the forms in-

cluded in the associated musical notation, and are correlated to the piano keyboard via a scale bars ruler placed behind the piano keys.

It obviates the use of accidentals, and clearly separates the spatial aspect of locating keys on the keyboard from the temporal aspect of the rhythmic activation of these keys.

Furthermore the diagrams, called here pianopics (for piano pictures) appear on the display and on the printed page side by side, maintaining the natural order "left picture for the left hand and right picture for the right hand".

In addition, the same few rules of operation and key assignment apply to the left and right hand pianopics in contrast to the "F" and "G" clefs in the standard notation where for example a "E" note would appear on different lines.

It represents left hand and right hand play in the same way, side by side, and maintains a visual alignment of keys in its vertical arrangement.

It uses a handful of easily remembered intuitive rules to operate.

It provides the pupil with a visual mental picture of a sequence of notes which is useful for memorizing musical pieces.

It never gets congested on the printed page since the tempo indicator handles the speed variations in the play.

It is directly applicable to songs chord accompaniment including christmas carols, multi-voice choral pieces, and popular music themes.

The advent of keyboard synthesizers now allows a composer to create full orchestrations by using the pianopics notation written side by side for the different instruments.

A definition for the new word "pianopic" referenced throughout this document is as follows: a graphical representation of a musical event involving none, one, or more notes, usually depicted as a scale bar diagram composed of black and white rectangular shapes placed side by side in an arrangement matching the twelve keys of an octave on a piano keyboard, from which hang none, one, or more black and/or white rectangles indicating the actual piano keys to strike. The pianopic may include above the scale bar a timing diagram composed of a numeral on top of each key representation matching the number of beats that key is held down, and a path starting with a dot, ending with an arrow, thus indicating the order in which the keys are struck. The scale bar may show on its left or its right side an octave symbol marker, usually one or more ar-

rows, indicating a shift of one or more octaves respectively to the left or the right from the middle "C" octave located in the center of the piano.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows the pianopics display illuminated for a 2 hand musical sequence using five keys, and a partial piano keyboard and the scale bars ruler slipped behind the piano keys helping correlate the piano keys to be struck with their representation on the pianopics display.

FIG. 2 shows the scale bars ruler.

FIG. 3 shows a couple of timing diagrams.

The first one involves the same note struck twice. the first time for a duration of three beats and the second time for the duration of two beats.

The second diagram involves three notes struck in succession for three, two, and three beats respectively.

FIG. 4 shows a scale bar with one arrow pointing to the right, thus indicating that the playing hand should be shifted one octave to the right of middle "C".

FIG. 5 shows how the keys are represented: a white rectangle for a white key and a smaller black rectangle for a black key hanging from and lined up with their counter parts on the scale bar.

FIG. 6 shows the top portion of a timing diagram. the "bouncing ball" and its path ending with the arrowhead indicating the order in which the keys are to be struck.

FIG. 7 shows three tone length indicators measured in number of beats.

FIG. 8 shows a set of left hand and right hand pianopics as it appears on the printed page, set up in a vertical manner so as to maintain the vertical alignment of the keys.

FIG. 9 shows a tempo indicator of thirty beats per minute, each beat lasting two seconds. This is the setting for a metronome. It is used to change on the fly the duration of the beat unit thus allowing variations in the speed of play while maintaining simplicity in the notation.

FIG. 10 shows a rest which is merely a timed symbol without a corresponding key.

FIG. 11 shows how a tied note is represented. When a key is to be struck in one

pianopic and then released in a following one, it appears in both pianopics as (S)ustain and (R)elease notes. The note duration is the sum of the "sustain" beats plus the "release" beats, here four beats.

FIG. 12 shows how legato play is achieved as notes overlap, that is when the next note starts before the first one is ended. In other words each note involved lasts a little longer than the duration indicated. It is represented by a shadow in the timing circle.

FIG. 13 shows the two banks of toggle switches used to light up the diagrams of the keys as well as the arrows on the display. There is one switch per key/arrow.

FIG. 14 shows the two banks of temporary switches used to light up the timing circles above each lighted key for the desired duration and in the proper order of play.

FIG. 15 is a block diagram of a manually operated pianopics display device according to the invention.

FIG. 16 is a block diagram of an automatically operated pianopics display device according to the invention.

FIG. 17 is a block diagram of a user controlled pianopics display device using a compact disk memory storage medium, a display memory unit, a liquid cristal display type for showing the pianopics shapes, and a user input unit to start and stop the device.

FIG. 18 is a block diagram of a computer system used as a pianopics display device, and running the pianopics method software.

FIG. 19 is a flow chart diagram of the front end of the pianopics software operating on a computer system used as a pianopics musical keyboard instruction display device.

FIG. 20 is a flow chart diagram describing the processing of a pianopics file for the device associated with the block diagram of FIG. 16.

FIG. 21 is a flow chart diagram describing the processing of a pianopics file for the device associated with the block diagram of FIG. 17.

FIG. 22 illustrate sheet music written in the pianopics musical notation system.

FIG. 23 illustrate standard sheet music with the addition of pianopic representations of chords.

FIG. 24 shows a top view of the top plate and electrical bulbs, and a side view of the same.

## REFERENCE NUMERALS IN DRAWINGS

- 1** Scale Bar
- 2** Scale bar Arrowhead
- 3** Bouncing Ball
- 4** Path
- 5** Path end Arrowhead
- 6** White key representation
- 7** Black key representation
- 8** Tone length Indicator
- 9** Key toggle switch
- 10** Tone length Indicator temporary switch
- 11** Legato play timing circle shadow
- 12** Scale bar arrow toggle switch
- 13** Timing circle diagram
- 14** Electrical bulb for a scale bar
- 15** Electrical bulb for a right arrow
- 16** Electrical bulb for a timing circle
- 17** Electrical bulb for a left arrow in a side view
- 18** Electrical bulb for a black key shape
- 19** Electrical bulb for a white key shape
- 20** Electrical bulb for a left arrow
- 101** Top plate with predrawn pianopics shapes
- 1501** Top plate of manually operated device with predrawn pianopics shapes
- 1502** Electric bulbs
- 1503** Electrical switches
- 1504** Electrical power source
- 1601** Top plate of automatically operated device with predrawn pianopics shapes
- 1602** Electric bulbs of automatically operated device
- 1603** Control unit
- 1604** Memory unit
- 1605** Solid state type electrical switches

**1606** Electrical power source

**1701** Liquid cristal display

**1702** Memory for display

**1703** Control unit

**1704** CD rom memory unit

**1705** User input unit

**1801** Computer display

**1802** Video display memory

**1803** CPU

**1804** Memory unit of computer system

**1805** Pianopics instruction software

**1806** User input via computer keyboard

**2001** Sample pianopics file format for plate and bulbs type display

**2101** Sample pianopics file format for LCD or monitor type display

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The musical keyboard instruction display device illustrated in the drawings comprises a box holding five components: an electrical energy source, a set of toggle switches generally designated **9**, a set of temporary switches designated **10**, a front plate made of a rigid transparent material imprinted with predrawn shapes such as circles **13**, arrows **2**, rectangles **6** and **7**, and finally a set of electrical bulbs each placed behind a plate shape and triggered by the activation of a switch **9** or **10** and its connected wiring thus illuminating that one plate shape.

For each shape predrawn on the front plate there is one switch, one bulb, and one wire connecting it to the electrical energy source. The temporary switches **10** are used to light up the circles **13** positioned above the scale bar **1**, each one switch **10** is located directly above a key shape. The toggle switches **9** are used to illuminate the white and black rectangles **6** and **7** respectively and are positioned below the keys, one for each key location in the scale bar **1**. Extra toggle switches **12** are placed just below the arrows **2** and activate these.

The scale bars ruler of Fig. 2 is to be placed behind the keys of a piano or musical keyboard and is meant to help relate the positions of the pianopics key shapes 6 and 7 to those of the actual piano keys by providing a common reference feature.

The pianopics display in Fig.1 is operated by the instructor in front of the pupil. The teacher depresses the toggle switches 9 first in order to light up the keys of the scale bar 1 and the arrows, thus giving the pupil the necessary information to locate on the piano keyboard which keys are to be struck. Then the teacher depresses the temporary switches on top of the display which correspond to the lighted key shapes 6 and 7 for the proper duration and in the proper order thus giving the pupil the necessary information about the rhythm for that sequence of notes. The pupil then replicates this event on the piano, using one's fingers as substitutes for the lighted circles.

In a preferred embodiment of which FIG. 15 is a block diagram, the keyboard instruction display device is a manually operated electro-optical display device comprising a top plate 1501 with predrawn pianopic shapes ,electrical bulbs 1502 , set of electrical switches 1503, and an electrical power source 1504, a system used just as described above, the block diagram of FIG. 15 showing the relationship of its elements .

In a preferred embodiment of which FIG. 16 is a block diagram, the electrical switches 9 are of the solid state type and are triggered by the control unit 1603, in a predefined sequence following instructions residing in the memory unit 1604, thus automating the teacher's sequence of actions. The memory unit 1604 holds an encoded datafile following the sample pianopics file format 2001. Each data record includes a bulb# corresponding to a specific bulb behind a specific shape of the top plate 1601, a beat# indicating the specific moment in time the event involving the bulb will take place, and an electrical state of ON or OFF indicating the nature of the event: bulb ON or bulb OFF. The control unit 1603 is build with digital circuitry, follows the flowchart of FIG. 20 and processes a data file of type 2001 stored in the memory unit 1604, one record at a time until the end of file marker is reached.

In preferred embodiments of which FIG. 17 is a block diagram, the electro-optical device is a liquid cristal, electroluminescence, plasma, or holographic display device, while the memory unit is a digital storage device such as memory chip, memory card, floppy disk, or CD rom in any combination of display and memory types. The user input



unit comprising a set of buttons used to load the memory for display holding the pianopics shapes data, load and start the sequence of instructions residing in the memory unit. FIG. 17 shows a block diagram for a device using a CD rom memory unit **1704** which comprises a number of tracks holding various pianopics data files. These are selected via a user input unit **1705** comprising a set of buttons, one for each track, along with a start button. The control unit **1707** processes one such data file in the format **2101** following the flowchart of FIG. 21 one record at a time until the end of file marker is reached. The liquid cristal display **1701** takes the place of the top plate **1601** and electrical bulbs **1602** of the previous embodiment. Instead of lighting up one bulb for one shape, the system lights up a set of pixels making up the same shape, the coding for which resides in the display memory **1702**.

In a preferred embodiment of which FIG. 18 is a block diagram, the musical keyboard instruction device is a computer system running the pianopics instruction software program **1805**. This software enables the user to select which pianopics data files of type **2101** stored in the memory unit **1805** to run, and to process it according to the flowchart of FIG. 21. The drawing of the pianopics diagrams on the computer system display **1801** is controlled by codes residing in the display memory **1802** which lights up a sets of pixels making up the pianopic shapes. Is is performed in a sequential manner so as to simulate the sequence of actions of the teacher using the first keyboard instruction device embodiment in FIG.15.

The pianopics musical notation in Fig.8 resembles closely the pianopics musical keyboard instruction display device in Fig.1 once it has been lit up. However since a timed event occurs when the display is operated as the circles light up rhytmically, the notation reflects this by using numerals **8** inside the circles of Fig.7 to signify how long each corresponding key is to be held down. The tone length is measured in number of beats. Fig. 6 shows the path diagram representing the order in which the keys are to be pressed. The dot **3** can be thought of as a bouncing ball following the path that ends with the arrowhead. The first key to be pressed is the one which tone duration circle **8** lies below the dot **3**. The next key is the one that lie on the path **4** of the bouncing ball and the last key is the one with the arrowhead **5** on top of its duration circle **8**. Fig. 3 shows two such timing diagrams, the first one lasting five beats, the second one lasting

seven beats.

In Fig. 8 two PianoPics are positioned side by side. The one on the left side is to be played by the left hand and the one on the right side is to be played by the right hand. Both hands start playing simultaneously with the keys 6 and 7 topped by the dots 3. The remainder of the play is dictated by the two timing diagrams and their sequence of beats. In this particular case the right hand stops playing three beats before the left hand does. A music line as is Fig. 8 ends along with the last note played by either hand. The notation represents the succession of pianopics created by the teacher, in a top down vertical fashion. This arrangement maintains the relative alignment of the keys thus helping in the locating of keys when one goes from reading one line to reading the next one.

The speed of play, that is the duration of a beat is governed by the tempo indicator of Fig. 9. In this case it is thirty beats per minute, each beat lasting two seconds. This by the way corresponds to the setting on a piano metronome.

Fig.10 shows a PianoPic without a key shape and is used to indicate a rest lasting three beats in this case.

Musical slurs and legato play are achieved as notes overlap in their tone durations, that is when each note lasts a little longer than the preceeding one. It is indicated in Fig.12 by a shadow 11 in the timing circle 8 of the notes involved.

When a key is to be struck in one pianopic and then released in a following one, a tied note occurs. It is represented in Fig.11 by a (S)ustain note in the top pianopic and the (R)elease note in the bottom pianopic. The total note duration is the sum of the beats for the (S)ustain and (R)elease notes, in this case it is four beats. (S)ustain notes, like the dotted ones, simultaneously start the play of a pianopic.

It will thus be seen that pianopics are to this music notation what words are to the written language. They are made up of notes just like words are made up of letters.

Accordingly, the reader will see that the pianopics display can be used to learn to play a keyboard instrument easily and conveniently.

Although the description above contains many specificities, these should not be construed as limiting the scope of the invention but as merely providing illustrations of some of the presently preferred embodiments of this invention.

For example, the display can include only one hand pianopics generator with or without scale shifting arrows, using permanently lit circled numerals instead of temporarily lit circles, or it might show two or more lines of two hand PianoPics designed to help in developing reading speed.

Also the shapes of all the components used to represent the keys or timing may be different such as ovals, trapezoidal, triangular, or a combination of elementary shapes. In addition, the display could also be the visual part of a computer software program showing on a computer monitor.

Thus the scope of the invention should be determined by the appended claims and their legal equivalents, rather than by the examples given.

What is claimed is:

✓ 1. A musical keyboard instruction device comprising:

a marking device in the form of a three scale bar ruler consisting of three sets of five dark and seven light rectangular shapes matching in width the black and white keys of a piano when placed behind these, with an octave symbol marker on the extreme left and an octave symbol marker on the extreme right;

a musical notation system based on indicia consisting each of one scale bar, dark and light rectangular shapes extending down from some of the rectangular shapes of the scale bar and meant to represent actual piano keys.

2. The system of claim 1 wherein the indicia include numerals positioned above the scale bar which includes an octave symbol marker, and vertically lined up with the rectangular shapes representing piano keys, said numerals indicating the number of beats each note gets, a path consisting of starting symbols, line segments, and ending symbols connecting the numerals in an order defined by placing a starting symbol above each starting note numeral, a line segment linking a starting note numeral with an intermediate note numeral, and an ending symbol above an ending note numeral, said path thus indicating the order in which the piano keys are pressed, said indicia representing a musical event involving one or more notes.

3. An electro-optical musical keyboard instruction device for music written in the music notation system of claim 2 comprising:

a top plate showing side by side two scale bars corresponding to left and right hand, under each said scale bar a set of light and dark rectangular shapes representing piano keys, each said light and dark rectangular shape having a duration symbol placed above it;

an electrical system including an array of electrical switches which when activated in concert with an electrical power source, a wiring harness and electrical bulbs, illuminate their corresponding top plate diagram elements ie: rectangular shapes, duration symbols, left and right octave symbol markers, in the order and for the duration that matches the desired musical event, thus generating on the top plate an image of left and right hand indicia of claim 2.

4. The musical keyboard instruction device of claim 3 in which the sequence of indicia is driven by a control unit which processes encoded data representing musical piano events and is stored in a memory unit device.

5. The musical keyboard instruction device of claim 4 in which the electrical bulbs and top plate are replaced by a liquid cristal display driven by a display memory unit which stores the indicia shapes as digitally encoded data, and where the control unit processes encoded data stored in a CD rom device.

6. The musical keyboard instruction device of claim 3 in which the electrical bulbs and top plate are replaced by the monitor of a computer system running a musical keyboard instruction software which allows the user to select and load a data file from a removable medium memory device, then execute the instructions stored in said data file to sequentially display on the monitor the indicia of claim 2 representing musical piano events encoded in said data file.

7. A method of teaching piano music comprising a music sheet comprising sets of indicia thereon corresponding to particular musical sequences of notes, said indicia comprising two distinct and separate parts, one indicating the precise location of the piano keys to be struck, the other indicating the order and the duration of the notes involved.

8. A method as described in claim 7, wherein said music sheet is replaced by an electro-optical display device.

9. The musical keyboard instruction device of claim 1, wherein said indicia are pianopics.

- [illegible]

Abstract of the Disclosure:

A musical keyboard instruction device composed of a pianopics display device and its associated keyboard musical notation, which convey readily the information needed to play the piano and any like keyboard instrument. It does so by using a partial keyboard picture-like diagram to identify the spatial location of the keys to be pressed and the metaphor of a bouncing ball over duration numerals as a timing diagram to indicate the length of the tones and their order of play.

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FIG. 1

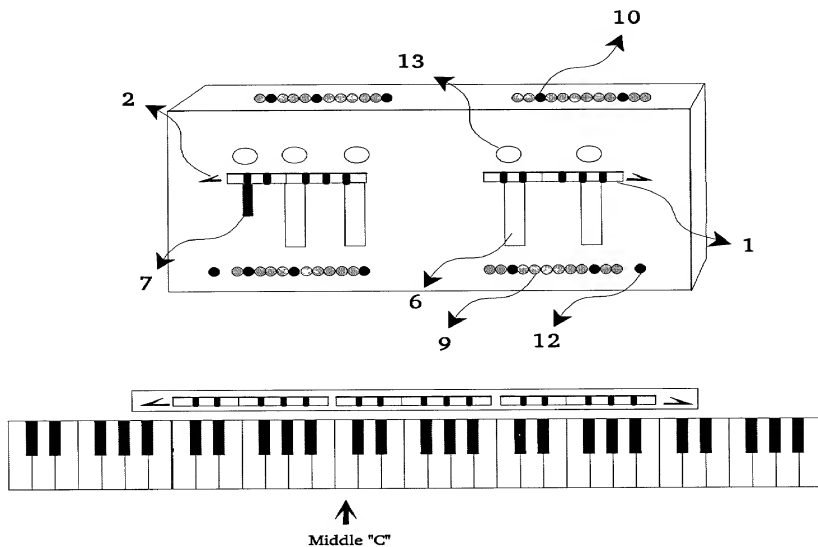


FIG. 2

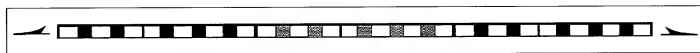


FIG. 13



FIG. 14

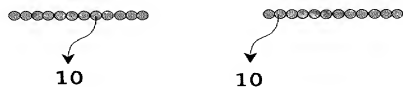


FIG. 3

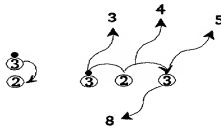


FIG. 5

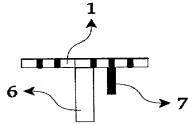


FIG. 9

T=30

FIG. 8

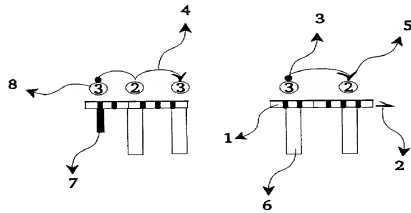


FIG. 7



FIG. 11

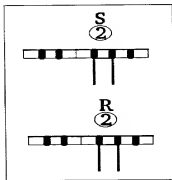


FIG. 10



FIG. 12

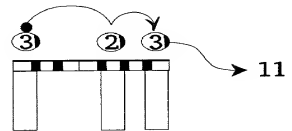




FIG. 15

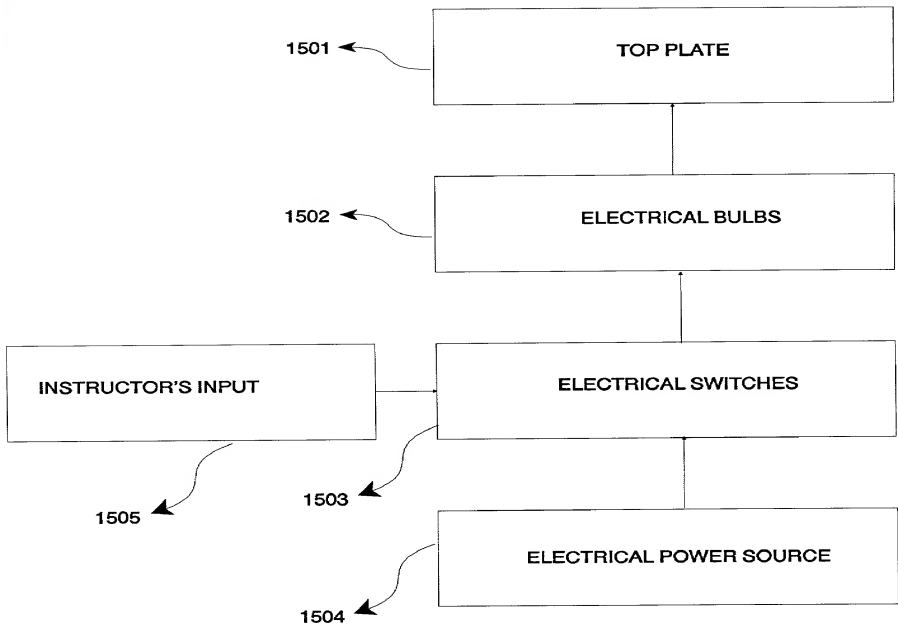


FIG. 16

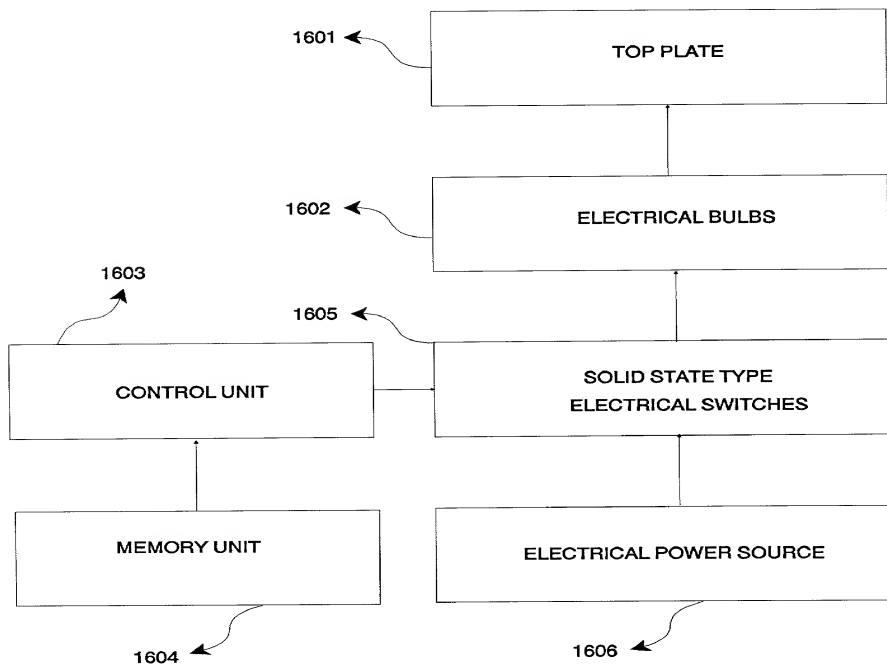


FIG. 17

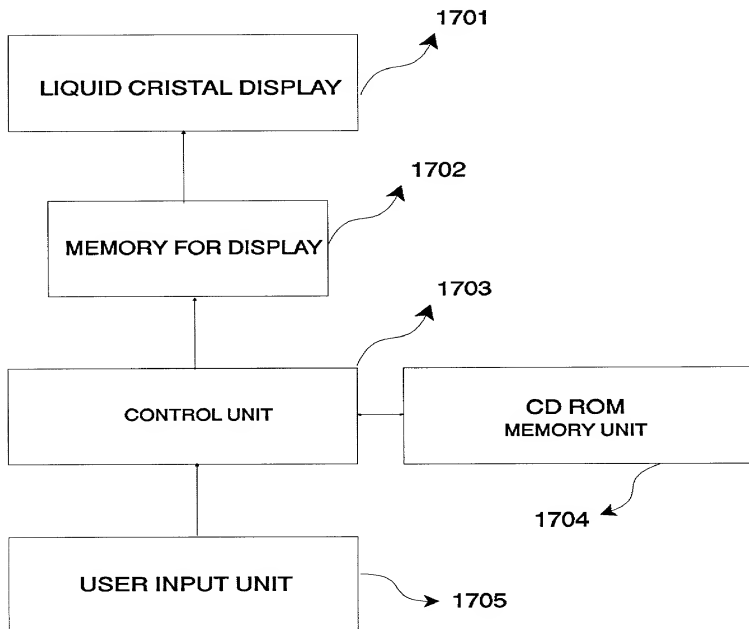


FIG. 18

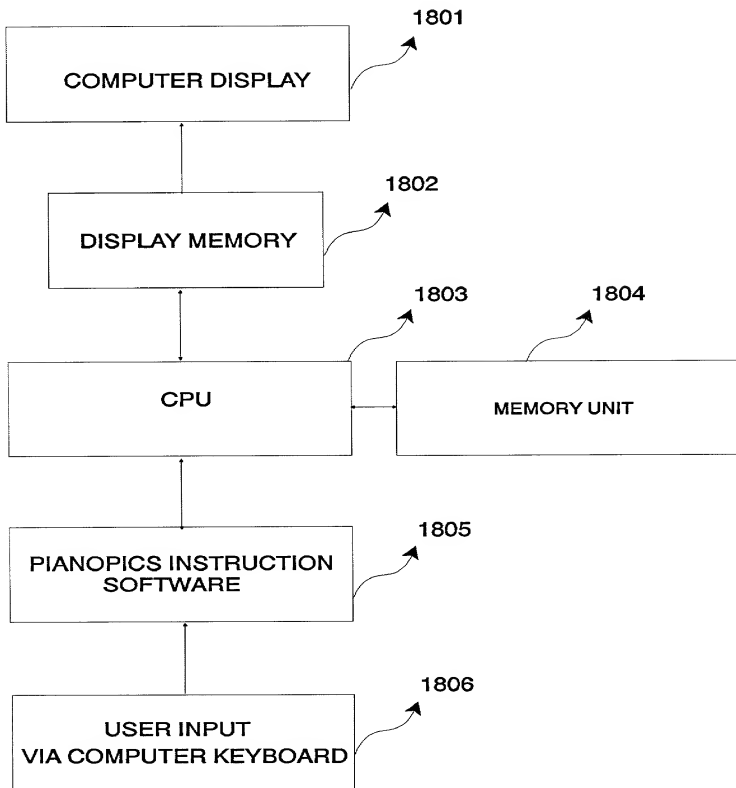


FIG. 19

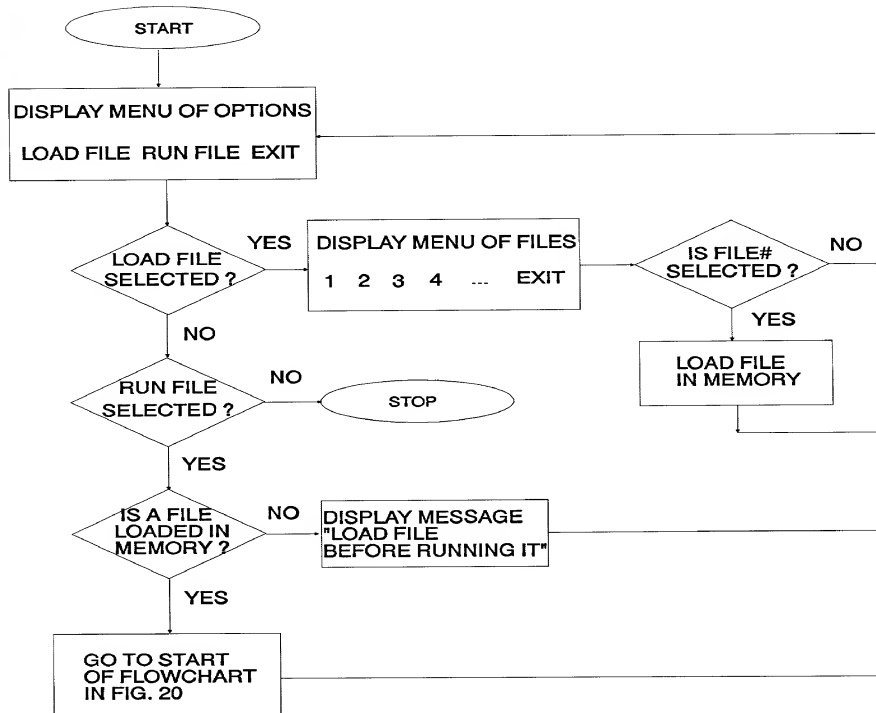


FIG. 20

2001

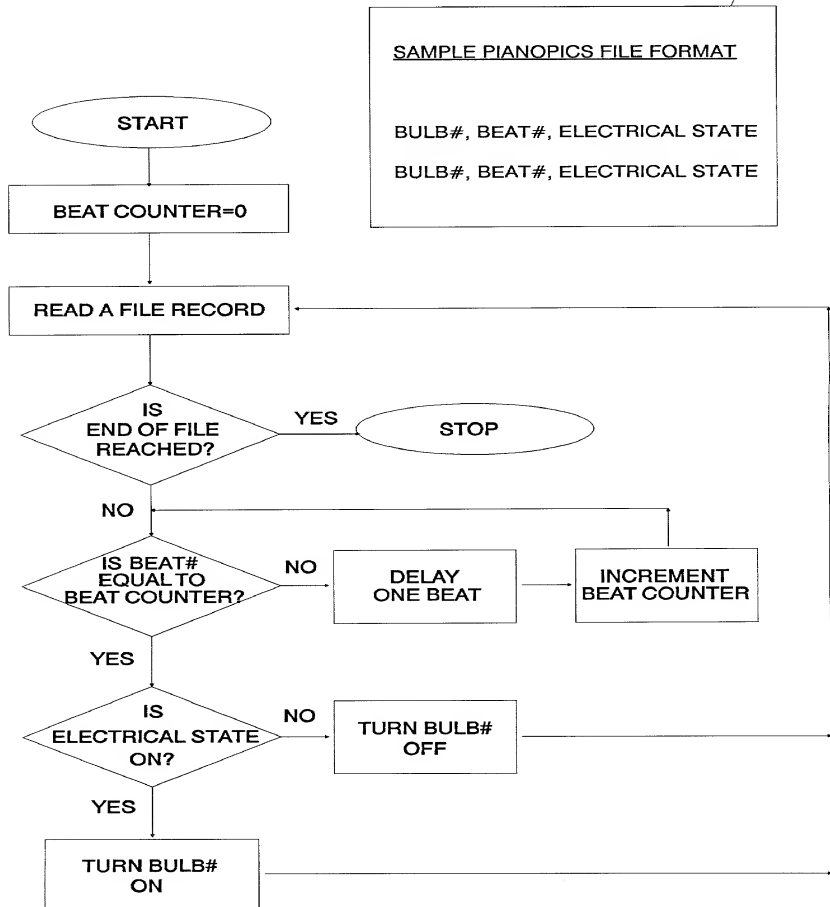
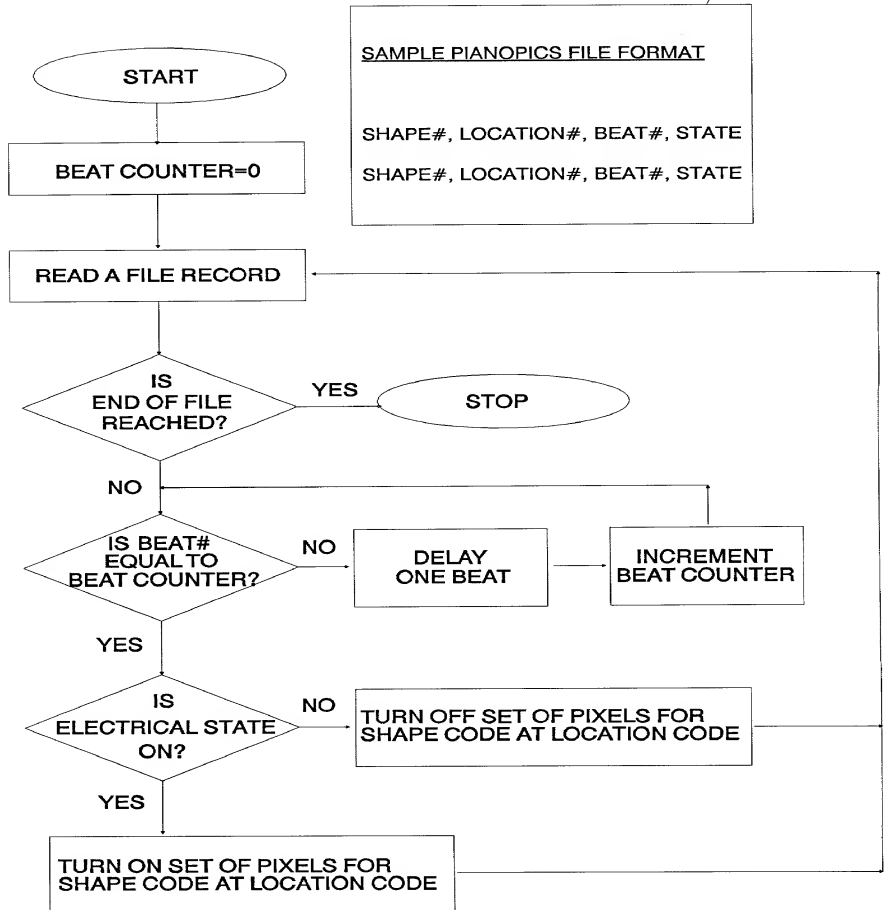


FIG. 21

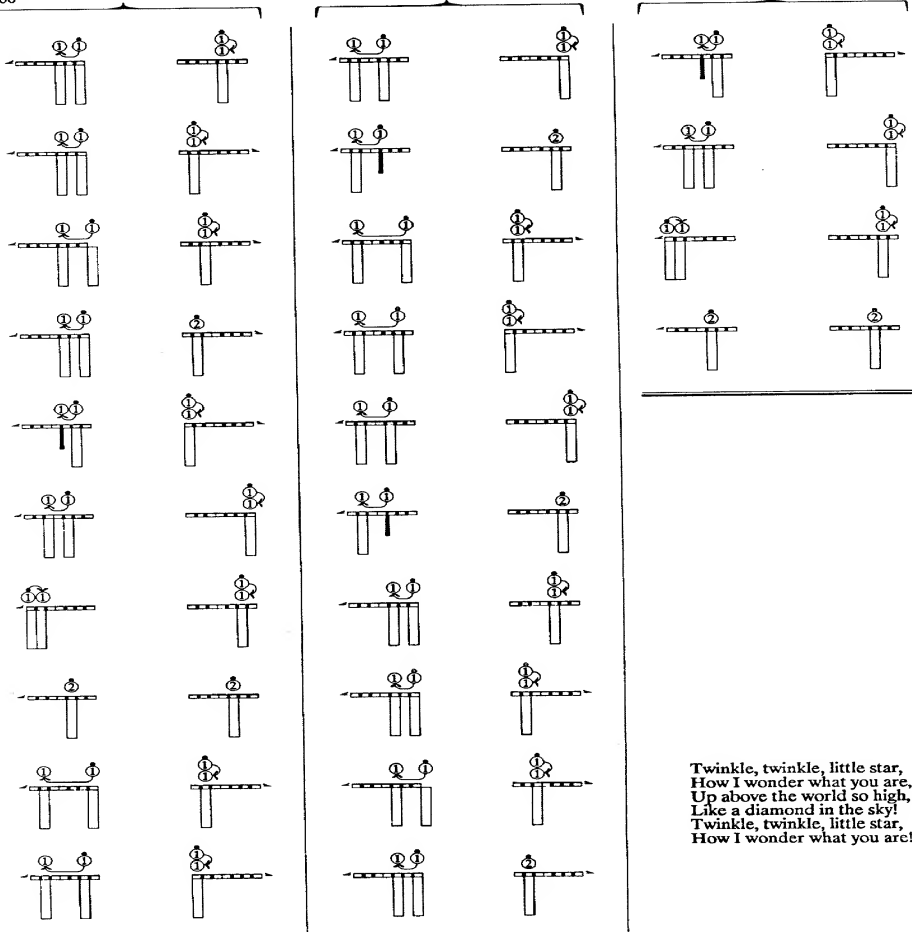
2101



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FIG. 22

 $T = 60$ 

Twinkle, twinkle, little star,  
How I wonder what you are,  
Up above the world so high,  
Like a diamond in the sky!  
Twinkle, twinkle, little star,  
How I wonder what you are!



FIG. 23

# America the Beautiful

By SAMUEL A. WARD

Slowly

**C**

**G7**

*p* O beau - ti - ful for spa - cious skies, For am - ber waves of

**C**

**G7**

grain, For pur - ple moun - tain ma - jes - ties A -

**D7**

**G**

**G7**

**C**

bove the fruit - ed plain. A - *mf* me - ri - ca, A -

**G7**

**C**

me - ri - ca, God shed His grace on thee, *p* And

**F**

**C**

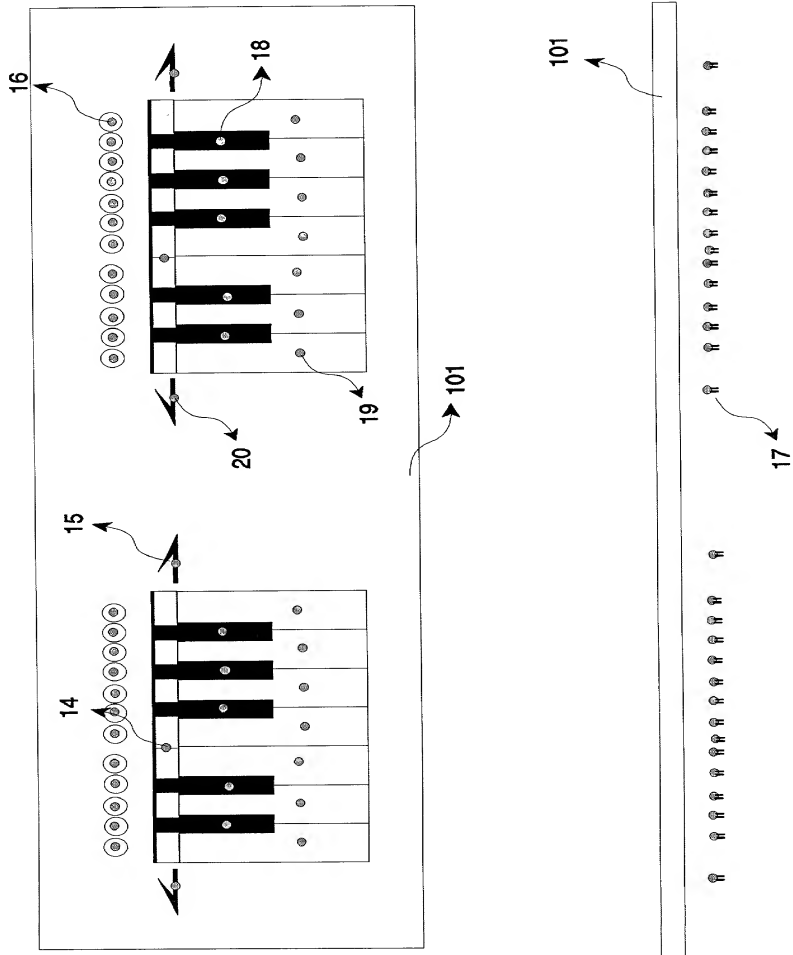
**F**

**G7**

**C**

crown thy good with bro - ther-hood, From sea to shin - ing sea.

FIG. 24



# DECLARATION FOR PATENT APPLICATION

Docket No. \_\_\_\_\_

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled "PIANOPICS DISPLAY AND ASSOCIATED MUSICAL NOTATION"

\_\_\_\_\_, the specification of which is attached hereto unless the following box is checked:

☐ was filed on \_\_\_\_\_ as United States Application Number or PCT International Application Number \_\_\_\_\_ and was amended on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed.

NONE

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) listed below.

60/018/919

June 4, 1996

(Application Number)

(Filing Date)

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35, U. S. C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

NONE

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole inventor (given name, family name) Jean-Claude Amar

Inventor's signature

Jean Claude Amar

Date 05/29/1997

Residence 109 Lincoln Street, Montclair NJ 07042

Citizenship USA

Post Office Address 109 Lincoln Street, Montclair NJ 07042

2025 RELEASE UNDER E.O. 14176

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant : Jean-Claude Amar  
Serial No. : --  
Filed : Submitted herewith  
For :

Assistant Commissioner for Patents  
Washington, D.C. 20231

**DECLARATION BY INDEPENDENT INVENTOR**  
**CLAIMING SMALL ENTITY STATUS**

Sir:

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled "PIANOPICS DISPLAY AND ASSOCIATED MUSICAL NOTATION", described in the application filed concurrently herewith.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract of law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern, or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract of law to assign, grant, convey, or license any rights in the invention is listed below: NONE

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this declaration is directed.

By: Jean Claude Amar  
Jean-Claude Amar

Date: 05/29/1997